

WHAT IS CLAIMED IS:

1. A control device for a semiconductor memory device having an auto precharge function of automatically performing a precharge operation in accordance with an access instruction, comprising:

a request receiving circuit for receiving a request for access to the semiconductor memory device;

a determining circuit for determining whether or not the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device based on the access request received by the request receiving circuit; and

an instruction outputting circuit for supplying the access instruction for enabling the auto precharge function or the access instruction for disabling the auto precharge function to the semiconductor memory device in accordance with a result of the determination by the determining circuit.

2. The control device for the semiconductor memory device according to claim 1, further comprising:

an area setting circuit in which address information showing an area in the semiconductor memory is set,

wherein the access request includes access address information on an address in the semiconductor memory device to be accessed, and

wherein the determining circuit determines whether or not the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device by comparing the address information set in the area setting circuit and the access address information of the access request received by the request receiving circuit.

3. The control device for the semiconductor memory device according to claim 2,

wherein, in the area setting circuit, address information showing an area in the semiconductor memory device to be accessed by the access instruction for enabling the auto precharge function is set, and

wherein the determining circuit determines that the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device when the access address information of the access request received by the request receiving circuit is included in the address information set in the area setting circuit.

4. The control device for the semiconductor memory device according to claim 2,

wherein, in the area setting circuit, address information showing an area in the semiconductor

memory device to be accessed by the access instruction for disabling the auto precharge function is set, and

wherein the determining circuit determines that the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device when the access address information of the access request received by the request receiving circuit and the address information set in the area setting circuit are different.

5. The control device for the semiconductor memory device according to claim 2,

wherein the area setting circuit is a register in which setting is changeable from the outside.

6. The control device for the semiconductor memory device according to claim 1,

wherein the request receiving circuit receives a signal indicating an access type with the access request, and

wherein the determining circuit determines whether or not the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device according to the signal indicating the access type received by the request receiving circuit.

7. The control device for the semiconductor memory according to claim 6,

wherein the signal indicating the access type is a signal indicating sequential access in which sequential areas in the semiconductor memory device are accessed or random access in which random areas in the semiconductor memory device are accessed, and

wherein the determining circuit determines that the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device when random access is indicated by the signal indicating the access type which is received by the request receiving circuit.

8. The control device for the semiconductor memory device according to claim 1,

wherein the access request includes data size information showing a quantity of data to be transferred,

the control device for the semiconductor memory device, further comprising:

a transfer number computing circuit for computing a number of times of access to the semiconductor memory device based on the data size information of the access request received by the request receiving circuit,

wherein the determining circuit determines whether or not the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device based on the number of

times of access computed by the transfer number computing circuit.

9. The control device for the semiconductor memory device according to claim 8,

wherein the transfer number computing circuit includes a counter circuit for counting the number of times of access to the semiconductor memory device, and

wherein the determining circuit determines whether or not the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device according to a value counted by the counter circuit.

10. The control device for the semiconductor memory device according to claim 9,

wherein, each time an access instruction is outputted from the instruction outputting circuit to the semiconductor memory device, the counter circuit decrements a count value by one with the number of times of access to the semiconductor memory device computed based on the data size information of the access request received by the request receiving circuit as an initial value, and

wherein the determining circuit determines that the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device when the value counted by the counter circuit is one.

11. The control device for the semiconductor memory device according to claim 1,

wherein the request receiving circuit receives requests for access to the semiconductor memory device outputted respectively from a plurality of master circuits, and

wherein the determining circuit determines whether or not the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device depending on the master circuits which outputted the access requests received by the request receiving circuit.

12. The control device for the semiconductor memory device according to claim 11, further comprising:

a master setting circuit in which a master circuit for supplying the access instruction for enabling the auto precharge function in response to the access request received by the request receiving circuit is set.

13. The control device for the semiconductor memory device according to claim 12,

wherein the master setting circuit is a register in which setting is changeable from the outside.

14. The control device for the semiconductor memory device according to claim 12,

wherein the master setting circuit is allowed to set whether or not the access instruction for

enabling the auto precharge function is supplied to the semiconductor memory device in response to the respective access requests from the plurality of master circuits received by the request receiving circuit.

15. The control device for the semiconductor memory device according to claim 1, further comprising:

a prefetch controlling circuit for reading data in an area specified by the access request and, in addition, data in sequential areas subsequent to the specified area when the access request received by the request receiving circuit is a read access request,

wherein the determining circuit determines that the access instruction for disabling the auto precharge function is supplied to the semiconductor memory circuit when the access request received by the request receiving circuit is the read access request.

16. A method of controlling a semiconductor memory device having an auto precharge function of automatically performing a precharge operation in accordance with an access instruction, comprising the steps of:

receiving a request for access to the semiconductor memory device;

determining whether or not the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device based on the received access request; and

supplying the access instruction for enabling the auto precharge function or the access instruction for disabling the auto precharge function to the semiconductor memory device in accordance with a result of the determination.

17. The method of controlling the semiconductor memory device according to claim 16,

wherein the access request includes access address information on an address in the semiconductor memory device to be accessed, and

wherein in determining whether or not the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device, the determination is performed by comparing the address information showing an area set in the semiconductor memory device and the received access address information of the access request.

18. The method of controlling the semiconductor memory device according to claim 17,

wherein the address information is address information showing an area in the semiconductor memory device to be accessed by the access instruction for enabling the auto precharge function, and



wherein in determining whether or not the access instruction for enabling the auto precharge function, it is determined that the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device when the set address information matches the received access address information of the access request.

19. The method of controlling the semiconductor memory device according to claim 16, further comprising the step of:

receiving a signal indicating an access type with the access request,

wherein in determining whether or not the access instruction for enabling the auto precharge function is supplied to the semiconductor memory circuit, whether or not the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device is determined in accordance with the received signal indicating the access type.

20. The method of controlling the semiconductor memory device according to claim 19,

wherein the signal indicating the access type is a signal indicating sequential access in which sequential areas in the semiconductor memory device are accessed or random access in which random areas in the semiconductor memory device are accessed, and

wherein in determining whether or not the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device, it is determined that the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device when random access is indicated by the received signal indicating the access type.

21. The method of controlling the semiconductor memory device according to claim 16,

wherein a prefetch function to read data in an area specified by the access request and, in addition, data in sequential areas subsequent to the specified area is provided when the received access request is a read access request, and

wherein in determining whether or not the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device, it is determined that the access instruction for disabling the auto precharge is supplied to the semiconductor memory device when the received access request is the read access request.

22. A method of controlling a semiconductor memory device having an auto precharge function of automatically performing a precharge operation in accordance with an access instruction, comprising the steps of:

receiving a request for access to the semiconductor memory device having data size information showing a quantity of data to be transferred;

computing a number of times of access to the semiconductor memory device based on the data size information of the received access request;

determining whether or not the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device based on the computed number of times of access; and

supplying the access instruction for enabling the auto precharge function or the access instruction for disabling the auto precharge function to the semiconductor memory device in accordance with a result of the determination.

23. A method of controlling a semiconductor memory device having an auto precharge function of automatically performing a precharge operation in accordance with an access instruction, comprising the steps of:

receiving a request for access to the semiconductor memory device outputted from any one of a plurality of master circuits;

determining whether or not the access instruction for enabling the auto precharge function is supplied to the semiconductor memory device in accordance with

the master circuit which outputs the received access request; and

supplying the access instruction for enabling the auto precharge function or the access instruction for disabling the auto precharge function to the semiconductor memory device in accordance with a result of the determination.